The Canadian Entomologist

LXVII ORILLIA, SEPTEMBER, 1935 No. 9

WESTERN MASSACHUSETTS ORTHOPTERA, PART I, PRELIMINARY LIST OF THE ACRIDIDAE.

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Professor Morse's well-known "Manual"[1] treats of the orthopterous fauna of Massachusetts in general, but of the eastern maritime area in particular. The region extending from the Worcester Plateau to the New York State Line includes a variety of environments which apparently have not been examined from the standpoint of Orthoptera nearly as thoroughly as the eastern half of the state. The present list of Acrididae is the result of collections made by the writer, chiefly at Cummington and about Amherst, during the past three years. Like our native ferns, grasshoppers are usually found amid surroundings suited to the ecological complex of the particular species concerned. Mention of some differences shown by the Life Zones of western Massachusetts may be helpful in understanding the distributional factors of local Acrididae.

The low areas of the Connecticut River Valley are Upper Austral in character. The altitude is less than 200 ft. above sea level near the river and such species as the Sycamore (*Platanus occidentalis* L) and the true Katydid (*Pterophylla camellifolia* (Fab.)) thrive. The Spade-footed Toad (*Scaphiopus holbrookii holbrookii* (Harlan) breeds in the lowlands of the valley.

Mt. Toby, rising to 1275 ft. at the summit, combines the flora and fauna of Transition and Canadian-Transition Zones. Oaks (*Quercus*) and Hickories (*Carya*) are prominent trees. The Hobble-bush (*Viburnum alnifolium* Marsh) and the Ram's Head Lady Slipper (*Cypripedium arietinum* R. Br.) occur on the upper slopes.

Cummington, in the western highlands, varies in elevation from 900 ft. along the Westfield River to 2145 ft. on Bryant Mountain. The southern portions of the Canadian Zone extend along the hilltops. The Yellow-bellied Sapsucker (*Sphyrapicus varius varius* (L)), a boreal species, nests at Cummington. Balsam (*Abies balsamea* (L.) Mill). a dominant member of the Northern Forest on Mt. Greylock, is occasional at Cummington, while Oaks and Hickories seldom mount the higher slopes. The Painted Trillium (*Trillium undulatum* Willd.), Ginseng (*Panax quinquefolium* L.) and American Mountain Ash (*Pyrus americana* (Marsh) DC.) occur here. Hardhack (*Spirea tomentosa* L.) predominates on the pasture lands throughout western Massachusetts.

The Deerfield River Valley, which is penetrated by an occasional Sycamore, exemplifies the manner in which Austral elements extend among the surrounding hills with their boreal life. Dr. Bromley[2] has indicated how the forest regions conform to elevation.

1—Morse, A.P., Manual of the Orthoptera of New England, Proc. Bost. Soc. Nat. Hist., 35, 6, 197-556, pl: 10-29. 1920.

2Bromley, S. W., The original forest types of southern New England, Ecol. Mon. 5, I, 61-89, 2 maps, 6 figs., 1935.

Unless otherwise noted, the records of Acrididae reported here have been made by the writer. In addition to records of the twenty-eight species collected personally, the records cited by Professor Morse in his "Manual" and the collections of the Massachusetts State College have been utilized. Obviously, the records of seasonal occurrence will be extended by further study, for instance, nymphs have been taken at later dates than adults in cases when they certainly had time to mature. Careful collecting will probably add several species to the present list. Readers knowing of additional records will be doing a favor by contributing them to the writer.

ACRYDIINAE.

1. *Nomotettix cristatus* (Scudder). Amherst, April 10 (M.S.C.), May 26-Aug. 14 (M.S.C.), in weeds, 400 ft., Sept. 12, Sept. 29, immature, Sept 20; Mt. Toby—Frequent near Cranberry Pond, 400 ft., June 25; Cummington—Frequent in weeds and mossy open pasture, 1400 ft., Sept. 2-Sept. 13, immature, Sept. 2; Plainfield—Open pasture, 1800 ft., immature, June 21; Sunderland—Aug. 26 (M.S.C.)
2. *Acrydium granulatum granulatum* Kirby. Amherst—April 9 (M.S.C.), Moist field, 400 ft., May 5; Cummington—Frequent, open woodland, Aug. 31.
3. *Acrydium ornatum* Say. Amherst—April 12-June 8 (M.S.C.), Hillside, 300 ft., Sept. 12, Sept. 20, Sept. 5 (M.S.C.); Mt. Toby—Beside trail, 1000 ft., May 16, June 25; Cummington—In potato field, 1350 ft., Sept. 13; Sunderland—April 27 (M.S.C.).
4. *Paratettix cucullatus cucullatus* (Burmeister). Cummington—A single colony beside Westfield River, 900 ft., has been visited during three seasons. July 29-Aug. 12, immature, common, Aug. 12.
5. *Tettigidea lateralis parvipennis* (Harris). Amherst—April 22 (M.S.C.), Sept. 14 (M.S.C.), in weeds, 300 ft., April 5, April 9; Cummington—About farm buildings and moist places in pasture, 1000-1400 ft., June 12-Aug. 27, mating, July 6, July 13, immature, Aug. 27; Cheshire—Crawling on side wall of barn, 900 ft., June 18.
6. *Pseudopomala brachyptera* (Scudder). Amherst—July 14 (M.S.C., Salman), Aug. 7 (M.S.C.), Aug. 14 (M.S.C.); Cummington—Grassland, 1400 ft., single females, July 27, Aug. 7; Cheshire—Abandoned field, 900 ft., one immature female, June 18.
7. *Dichromorpha viridis* (Scudder). Amherst—Aug. 7-Aug. 29 (M.S.C.), Common, moist grassland, 200-400 ft., Sept. 11-Oct. 3, mating, Sept. 12, Oct. 3, Beside brook, 180 ft., Sept. 12; Cummington—Common, beside Westfield River, 900 ft., mating, immature stages included, July 29, Aug. 13, moist open pasture, July 20.
8. *Orphulella speciosa* (Scudder). Amherst—July 19 (M.S.C.), Aug. 29 (M. S.C.), Sept. 29; Cummington—Abundant in open pastures, 900-1450 ft., July 12-Sept. 2, immature, July 16-Aug. 26; Adams—(Morse); Mt. Greylock—(Hebard, see Morse).
9. *Chloealtis conspersa* Harris. Amherst—July 14 (M.S.C.), Aug 1 (M.S.C.), Mt. Toby—Frequent, wood road, 800 ft., immature stages included, June 25, immature, June 16 (M.S.C.); Cummington—Common in pastures, open woodland, along fences at edges of fields, 900-1400 ft., July 3-Sept. 2, im-

mature, June 12-July 22; Plainfield—Open pasture, 1800 ft., immature stages frequent, June 21.

10. *Chorthippus curtipennis* (Harris). Amherst—Aug. 7-Sept. 3 (M.S.C.), common in fields, 200-400 ft., Sept. 6-Oct. 3, single male, Nov. 15; Cummington—Common, moist fields and pastures, 1200-1400 ft., July 24-Sept. 17, immature, July 22, Aug. 26, Sept. 17.
11. *Stethophyma gracile* (Scudder). Mt. Greylock—(Morse), 3500 ft., Aug. 17, 1894 (M.S.C.).

OEDIPODINAE.

12. *Arphia xanthoptera* (Burmeister). Amherst—Common, pastures, 180-400 ft., Sept. 11-Oct. 5, Oct. 31 (M.S.C., Pratt), Sept. 3 (M.S.C.).
13. *Arphia sulphurea* (Fabricius). Amherst—May 20-July 6 (M.S.C.); Mt. Toby—Wood road, 1000 ft., June 25, June 27, immature female taken April 14 emerged as adult in greenhouse rearing cage May 5; Cummington—Common, pastures, 1200-1400 ft., June 12-July 29, one female, Sept. 10.
14. *Chortophaga viridifasciata* (DeGeer). Amherst—Abundant, fields and open pasture, 200-400 ft., April 15-June 30, immature, April 16-Oct. 17, brown individuals reared from green nymphs in greenhouse lived two weeks as adults; Mt. Toby—Frequent in grass beside trail, 1000 ft., June 25; Cummington—Common, everywhere in open, June 12—Aug. 16, immature, Sept. 18.
15. *Encoptolophus sordidus sordidus* (Burmeister). Amherst—Abundant in fields, pastures, 200-400 ft., Sept. 6-Nov. 1, as late as Nov. 22, 1932, after official records showed night temperatures of 22° F., immature, Sept. 1, mating, Nov. 3; Cummington—Abundant, fields and pastures, 900-1450 ft., Aug. 29-Sept. 17, immature, July 20-Aug. 26.
16. *Camnula pellucida* (Scudder). Cummington—Abundant, pastures, 1000-1450 ft., July 8-Sept. 12; immature, July 22.
17. *Pardalophora apiculata* (Harris). Amherst—Open pasture, 300 ft., May 5, June 2 (M.S.C.), July 3 (M.S.C.), immature specimens, Oct. 3; Cummington—Common, pastures, 1200-1450 ft., June 12-July 15, ovipositing, June 26, immature frequent, Sept. 1-Oct. 15, examples of the latter reared to maturity in greenhouse cages, one immature female hopping about among patches of snow, about 40° F., 1400 ft., Christmas Day, 1932.
18. *Dissosteira carolina* (Linnaeus). Amherst—Sept. 1-Oct. 15 (M.S.C.); Cummington—Abundant, fields, pastures, roadsides, 900-1450 ft., July 10-Oct. 15, immature, July 1-July 29.
19. *Spharagemon collare* (Scudder). Easthampton—(Morse).
20. *Spharagemon bolli* (Scudder). Cummington—Common in open pasture, occasional along edges of fields, 1000-1450 ft., July 24-Sept. 15, single immature female, July 1.
21. *Psinidia fenestralis fenestralis* (Serville). Amherst—Single colony of less than 20 individuals discovered by H. D. Pratt in sandy area beside brook, 180 ft., Oct. 5, 1933, also present, Sept. 11-Oct. 11, 1934.
22. *Circotettix verruculatus* (Kirby). Cummington—Abundant on exposed ledges and pasture slopes, 1100-1450 ft., July 12-Sept. 1, immature, July 8-July 20; Adams—Aug. 17, 1894 (M.S.C.); Palmer—(Morse).

CYRTACANTHACRINAE.

23. *Schistocerca alutacea* (Harris). (Unicolorous phase). Amherst—One specimen, Sept. 3, 1893 (M.S.C.), two specimens, Oct. 26, 1900 (M.S.C.).
24. *Podisma glacialis glacialis* (Scudder). Mt. Greylock—(Morse); One male, probably from Mt. Toby (M.S.C.).
25. *Melanoplus mexicanus mexicanus* (Saussure). Amherst—Frequent, fields and open pastures, 200-400 ft., Sept. 11-Oct. 8, mating, Oct. 8; Cummington—Common, fields and pastures, 1100-1400 ft., July 1-Sept. 1, immature, June 12-Sept. 18; Sunderland—Aug. 26 (M.S.C.).
26. *Melanoplus fasciatus* (F. Walker). Amherst—Open pasture, 450 ft., single male, June 18; Mt. Toby—Two immature males near Cranberry Pond, 400 ft., June 18, occasional in woodroad, 800-1000 ft., June 25; Cummington—Frequent, shaded spots of brushy pasture and clearings in woodland, 1100-1400 ft., July 23-July 31, single immature male, June 12.
27. *Melanoplus femur-rubrum femur-rubrum* (DeGeer). Amherst—Aug. 7-Aug. 29 (M.S.C.), abundant in open, 200-400 ft., Oct. 3-Oct. 21; Mt. Toby—Immature, Aug. 25 (M.S.C.); Cummington—Abundant in open, 900-1400 ft., July 29-Sept. 18, immature, June 22-Sept. 24, mating, Sept. 11.
28. *Melanoplus borealis borealis* (Fieber). Mt. Toby—Open pasture, 400 ft., one female, June 20, in wood road, 1000 ft., two females, June 25; Cummington—Frequent, fields and rich pasture, 1200-1400 ft., June 12-Aug 16; Mt. Greylock—(Morse).
29. *Melanoplus confusus* Scudder. Mt. Toby—Single male near Cranberry Pond, 400 ft., June 18; Cummington—Frequent, fields and hillsides, 1200-1400 ft., June 12-July 29, mating, July 26.
30. *Melanoplus keeleri luridus* (Dodge). Amherst—Small colony discovered in bushy pasture, 300 ft., Oct. 3, 1934, July 28 (M.S.C.); Cummington—Three localized colonies in pasture, 1100-1400 ft., July 22-Oct. 14, immature, July 29.
31. *Melanoplus punctulatus punctulatus* (Scudder). Amherst—One large colony in pine grove at edge of open pasture, visited during three seasons, 350 ft., other individuals occasional, Sept. 5-Oct. 3, immature, Sept. 5; Mt. Toby—Pine tree, 600 ft., single male, Oct. 16, Aug. 4 (M.S.C.); Cummington—Single male in pasture, 1300 ft., Sept. 14.
32. *Melanoplus bivittatus* (Say). Amherst—In field, 300 ft., single immature specimen, June 23, July 21-Aug. 9 (M.S.C.); Mt. Toby—In woodroad, 1000 ft., single immature specimen, June 25; Cummington—Common in fields, occasional in grassy spots in woodland and margins of swamps, 900-1400 ft., July 8-Aug. 14, immature, common, June 12-July 20.
33. *Melanoplus mancus* (S. I. Smith). Mt. Everett—2600 ft., (Morse).
34. *Melanoplus scudderi scudderi* (Uhler). Springfield—(Allen, see Morse).
35. *Melanoplus viridipes* (Scudder) (undoubtedly the *eurycercus* race of Hebard). Mt. Greylock, Bashbish Falls, Great Barrington—(Collected by the late C. W. Johnson, see Morse).

NOTES ON THE SEXUAL CHARACTERS OF SAPRINUS (HISTERIDAE, COLEOP.) WITH THE DESCRIPTION OF A NEW SPECIES

BY RUPERT L. WENZEL,
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In the course of an investigation of the secondary sexual characters of *Saprinus assimilis* Payk.[1], the writer found five specimens of an hitherto undescribed species of *Saprinus*. At the request of Mr. Henry Dybas, who submitted the material for determination and study, the description of the species is included with the following notes.

Saprinus assimilis Payk, is well-known for its characteristic marginal sulcus on the pygidium. In the typical individuals the sulcus is continuous around the apex of the pygidium, but in many it is interrupted at the apex. The latter form was described as *S. assimilis* ab. *semisulcus* Hatch[2]. The writer, who has been confronted with the problem of separating the sexes by some characters other than those of the genitalia themselves, dissected two hundred and thirty-two specimens of the species under discussion. Without exception, one hundred and twenty-two specimens of the typical *assimilis* proved to be females, while the one hundred and eleven specimens of ab. *semisulcus* were males. The writer regards it as conclusive, therefore, that the aberration is nothing more than the male of the species. The secondary sexual characteristics of *S. assimilis* may be described as follows:

Male: Pygidium convex, apex sparsely, rather coarsely punctate; marginal sulcus interrupted at apex. Length 3.9-4.8 mm. Width 2.9-3.5 mm. Average length, 4.32 mm. Average width, 3.21 mm.

Female: Pygidium feebly concave at apex, the latter coarsely, densely punctate; marginal sulcus uninterrupted at apex. Length, 5-6.75 mm. Width, 3.20-4.1 mm. Average length, 5.52 mm. Average width, 3.81 mm.

Material examined included specimens from Illinois, Wisconsin, Michigan, Indiana, Iowa, Massachusetts, and Pennsylvania.

Saprinus (Hypocaccus) alutiger n. sp.

Male: Oblong-oval, convex; black, with an aeneous lustre, shining.

Front of head margined, finely alutaceous; the transverse discal stria meeting the frontal carina at lateral fourth of the latter.

Pronotum twice as broad as long; sides feebly arcuate, converging slightly to front; base evenly arcuate; surface coarsely, rather densely punctate, the punctures at the sides and apex strigose; disk with a broadly triangular space, apparently smooth, but microscopically punctate; the basal margin more coarsely punctate than the sides and apex.

Elytra about one-third longer than pronotum, moderately, not coarsely, rather densely punctate on apical five-eighths from second dorsal to sutural stria; interspace between the first and second dorsal striae sparsely punctate on apical third, with a few scattered punctures to basal fourth; interspaces from second to fourth dorsal moderately punctate to basal half, from thence to basal fourth with a few scattered punctures. The entire surface of the elytra minutely aluta-

[1]Monogr. Histeridum, Upsala, p. 63, 1811.
[2]Can. Ent., LXI, p. 79, 1929.

ceous, excepting a scutellar area, limited on the sides by the fourth dorsal and the suture, so as to clearly define a scutellar mirror despite the sparsity of punctures between the striae on the basal half; mirror microscopically punctate. Internal subhumeral stria varying from abbreviated slightly at apex only to present only on apical half; humeral short, basal, close to the first dorsal; dorsal striae coarsely punctate, first dorsal seven-eighths to apex, two and three becoming successively shorter, fourth extending to middle, arched at base, not joining sutural, which is present only from basal third to apical fifth.

Propygidium and pygidium finely, sparsely punctate, the pygidium less densely so at apex.

Prosternum compressed, bistriate, the striae nearly entire, converging in front.

Mesosternum broadly, feebly emarginate, microscopically punctate.

Front tibiae with four teeth, the apical three large, prominent, fourth indistinct.

Length, 2.3-2.75 mm. Width, 1.8-2 mm.

Female: Upper surface more densely, slightly more coarsely punctate throughout than in the male. Mesosternum very coarsely, rather sparsely punctate at middle, much less coarsely so laterad. Front tibiae with five teeth, the apical three large, prominent, the basal two small but distinct.

This species belongs to Group VIII of Horn's classification.

It is evidently closely allied to *S. iris* Fall, but differs in (a) the greater extent of punctures apically on the elytra, (b) the length of the sutural stria, (c) the presence of punctures basally.

Holotype: Male, taken at Lake Ripley, Wisconsin, on July 24th, 1933, by Mr. J. P. E. Morrison; deposited in the collection of the writer.

Allotype: Female, same data as above; deposited in the collection of the writer.

Paratypes: Same data as above; two specimens deposited in the collection of Mr. Henry Dybas of Chicago, one in the collection of the Field Museum of Natural History. Two specimens, Bev. Shores, Ind., April 29, 1935, collected by Mr. H. Dybas, and one specimen, same locality, April 30, 1935, collected by R. L. Wenzel, all deposited in the collection of the writer.

APHID NOTES[1]

BY GEORGE F. KNOWLTON,
Logan, Utah.

Aphids of many kinds persist in causing injury to range plants as well as to shade, forest, ornamental and crop plants. The following report deals largely with aphids taken in Utah and nearby states. The writer is indebted to Dr. A. A. Granovsky of the University of Minnesota for identifying a number of the species belonging to the tribe Callipterini.

Cinara curvipes (Patch). Beaver, Utah[2], May 3, 1934.

C. sibiricae (G. and P.) On juniper, Tacoma, Washington, July 29, 1933

[1]Contribution from the Department of Entomology, Utah Agricultural Experiment Station. Authorized for publication by Director February 4, 1935.

[2]Unless otherwise indicated, locality is in Utah and specimens have been collected by the writer.

(A. J. Hanson).

Essigella pini Wilson. On *Pinus,* Logan Canyon, August 24, 1934 (Knowlton: T. O. Thatcher).

E. hoerneri G. and P. On *Pinus,* Logan Canyon, August 24, 1934 (Knowlton: C. F. Smith).

E. fusca G. and P. On *Pinus,* Logan Canyon, August 24, 1934.

Tamalia coweni (Ckl.). In folded leaf pseudo-galls on *Arctostapholos pungens* (?), Ash Creek Canyon, May 1, 1934 (Det. M. A. Palmer); also on *Quercus,* at Forest Grove, Oregon, October 5, 1919 (A. C. Burrill).

Myzocallis discolor var *coloradensis* G. and P. On *Quercus gambelli* in Marysville Canyon, June 27, 1933; Park City; Provo; and Willow Creek Canyon.

M. ulmifolii (Mon.). On *Ulmus americana,* Fielding, September 3, 1925; also on *Ulmus* at Columbus, Ohio, June 12, 1925.

M. californicus Bak. On *Quercus gambelli* at American Fork and Spanish Fork Canyons, July 6, 1925; Ogden, June 28, 1925; Scipio, July 7, 1925; and Weber Canyon, September 4, 1925; also on oak at Forest Grove and McMinnerville, Oregon, Oct. 1919 (Burrill).

M. coryli (Goeze). On *Corylus* in nursery at Providence, October, 1923; also at Forest Grove and McMinnerville, Oregon, October 1919 (Burrill).

Monellia caryae (Mon.). On *Juglans* at Hurricane, June 25, 1933; Lake View, August 30, 1930; Rockville, June 26, 1933; Vineyard, August 30, 1930.

Chromaphis juglandicola (Kalt.). On English Walnut, Salt Lake City, July 1934; also at Forest Grove, Oregon, October, 1919 (Burrill).

Calaphis annulata (Koch). On *Betula papyrifera* at Logan, October 8, 1925.

C. betulaecolens (Fitch.) On *Betula fontinalis* at Emigration Canyon, June 21, 1925; Logan Canyon, June, 1925.

Oestlundiella flava (David.). On *Alnus oregona,* at Forest Grove, Oregon, October 20, 1919 (Burrill).

Euceraphis brevis Baker. On *Betula fontinalis,* in Logan Canyon, May 30, 1929.

Iziphiya flabella (San.). On sedge at Richfield and Glenwood, July 29, 1926.

Drepanosiphum bragii Gil. Card Canyon, July 13, 1933; Logan Canyon.

Chaitophorus populella G. and P. Morgan, June 30, 1925; Pinecrest, June 21, 1925.

C. populifoliae Oest. On *Populus tremuloides,* Strawberry Creek, Idaho, August 24, 1934 (Knowlton, Smith).

Periphyllus negundinis (Thos.). On *Acer negundo* in Brigham Canyon, June 7, 1932; Card Canyon, August 3, 1933; Providence; Salt Lake; also at Bozeman, Montana, August 5, 1926 (C. B. Philip).

P. populicola (Thos.). On *Populus* spp. at Duchesne; Duchesne River Valley; Green River; Indian Canyon; Manning; Randlett; Reserve Creek (Tanner); Strawberry Valley; Sterling, and Tony Grove Camp in Logan Canyon.

P. populicola var. *bruneri* (Wil.). On *Populus balsamifera* at Taylor, June 7, 1932.

Pterocomma populea (Kalt.). On bark of *Populus balsamifera* at Evans,

May 13, 1930; Hyde Park, June 22, 1925; Salt Lake City, June 21, 1925.

Clavigerus salicis (L.). On *Salix* at American Fork Canyon, July 6, 1925; River Heights, July 8, 1933.

C. bicolor (Oest.). On *Salix* at Beaver, May 3, 1934; *S. lutea* at Brighton, shore of Silver Lake, June 29, 1925; Logan Canyon; Park City; Peterson; also at Paris, Idaho, June 24, 1926.

C. populifoliae (Fitch.). On *Populus tremuloides* at Indian Canyon, June 12, 1933.

C. smithiae (Mon.). On *Populus* at Ogden, May 20, 1930; also at Twin Falls, Idaho, and Forest Grove, Oregon (Burrill).

C. beulahensis (Ckl.). Taken on bark of *Populus tremuloides* at Cedar Breaks (10,500 feet elevation), July 8, 1925; American Fork Canyon; Bear River City; Big Cottonwood Canyon; Fish Lake; Logan Canyon; Red Canyon (10,000 feet elevation); also collected at Mink Creek, Idaho, June 24, 1925.

Hyalopterus atriplicis (L.). On *Chenopodium album* at Bluff, June 19, 1933; Cornish; Ft. Duchesne; Logan; Monticello; Provo; Thatcher; Torry; Monroe, Lynndyl; Zion National Park.

H. arundinis Fab. On plum leaves, Farmington, June 26, 1930; Highland Drive; Lake View; Monticello; Roy; Vineyard. On *Phragmites* at Bear River Bay; Centerville; St. George; Zion Canyon.

Aphis cornifoliae Fitch. On *Cornus* in Ogden Canyon, May 20, 1930.

A. filifoliae (G. and P.). On *Artemisia,* at Brigham City, August, 1927; also on *A. tridentata* and *filifolia* west of Evanston, Wyoming, August 4, 1932.

A. kachena Hottes. On *Castilleja,* Bryce Canyon, July 14, 1925.

A. cerasifoliae Fitch. Curling chokecherry leaves, Brigham Canyon, June 17, 1930; Logan Canyon.

A. cardui L. On plum leaves at Collinston, October 22, 1929; Farmington; Fielding; Hyde Park; Provo; Salt Lake City.

A. lugentis Wil. On *Senecio hydrophyllus,* Logan meadows, August 19, 1925, and *S. pratensis,* August 20, 1923.

A. lupini G. and P. Abundant upon *Lupinus,* Grouse Creek August 13, 1932; Reserve Creek, Raft River Mountains, June, 1928 (Tanner); Wellsville, July, 1933.

A. gossypii Gl. On cantaloupe, Green River, September 2, 1934; on *Catalpa,* Salt Lake City, August, 1932.

A. maidis Fitch. On grass, Brigham City, July, 1932.

A. medicaginis Koch. On *Melilotus alba,* Fielding, September 2, 1930; also on *Astragalus* at Littlefield, Arizona, May 16, 1934 (E. W. Davis); *M. alba,* Bozeman; and *Glycorrhiza* at Manhattan, Montana, August 14, 1926 (Philip).

A. hermistonii Wil. On *Artemisia tridentata,* Logan, September 4, 1926.

A. filifoliae (G. and P.). On *Artemisia* at Wellsville, August 13, 1925.

A. minutissema (G. and P.) On *Artemisia* at Trenton, April 30, 1928.

A. chrysothamincola (G. and P.). On *Chrysothamnus* at Amalga, September 2, 1926; Trenton, September 23, 1926.

A. rubicola Oest. On raspberry leaves at Eden, July 27, 1925; Lake View, June 5, 1930.

A. ribiensis (G. and P.). On currant at Willard, July 8, 1933, and October 11, 1927.

A. varians Patch. Curling currant leaves at Centerville, Salt Lake City, and Mill Creek, June 18, 1930; Logan, June 20, 1928; Farmington; Snowville; West Jordan.

A. rumicis L. On sugar-beet, Logan, July 21, 1934; also on *Evonymus atropurpureus* at Bozeman, Montana, August 6, 1926 (Phillip); on *Dahlia*, Puyallup, Washington, August 10, 1933 (Hanson).

A. infrequens Knlt. Aptera on *Chrysothamnus parryi* at Benjamin, August 8, 1934. Sensoria present antennal III of aptera, much as in alate.

Epameibaphis frigidae (Oest.) Alate vivipara on sagebrush at Cedar Creek, June 9, 1930; apterous vivipara, Blue Creek, June 7, 1930; Cedar Spring, April 30, 1930; Curlew Valley; Hardup; Hansel's Valley; Newton, Promontory; Rattlesnake Pass, May 17, 1928; and Snowville. Also taken upon *Artemisia* at Lyman and LeRoy, Wyoming, August 4, 1932.

E. atricornis G. and P. Winged vivipara collected on *Artemisia tridentata*, at Cedar Creek and Curlew Valley on June 9, 1930; Mill Creek Canyon, June 28, 1925; and Rattlesnake Pass, May 19, 1930. Aptera at Brigham City, June 17, July 19, and September 27, 1927; Cache Junction, May 17, 1927; Cedar Creek, Curlew, Kosmo, and Hardup, June 9, 1930; Deweyville; Honeyville; 12 miles southeast of Hurricane; Providence; and Snowville.

Microsiphum artemiseae (Gil.). On *Artemisia tridentata* and *A. vulgaris*, at Blacksmith Fork Canyon, July 8, 1927; Brigham City, October 11, 1927; Cornish, August 22, 1927; Collinston; Honeyville; Hyrum; Logan; Mendon; Sunset; Trementon; Trenton. Also collected at Emigration Canyon, Mink Creek, and Preston, Idaho, August 16, 1927.

Cavariella capreae (Fab.). On *Salix*, Big Cottonwood Canyon, June 29, 1925; also on celery at Bozeman, Montana, August 18, 1926 (Philip); on *Salix babylanica* at Columbus, Ohio (about 85 per cent being parasitized)—May 12, 1925.

C. theobaldi (Gill.). On Salix, Big Cottonwood Canyon, June 29, 1925; also on celery at Bozeman, Montana, August 18, 1926 (Philip); on *Salix* at Truckee, California, June 17, 1934.

Cerosipha rubifolii (Thos.). On raspberry at Clearfield September 17, 1925; Logan, July 7, 1923; Ogden, July 27, 1925. Also at Yelm, Washington, June 1, 1933 (Hanson); Buckeye Lake, Ohio, October 10, 1924.

Pseudoepimebaphis glauca (G. and P.). On *Artemisia* at Blue Spring Hills, May 19, 1930; Dry Lake, August 10, 1927; Grouse Creek, August 13, 1932; Hansel's Mountains; Kelton; Logan. Also collected at 12 miles west of Evanston and at Fort Bridger, Wyoming, August 4, 1932; and at Holbrook, Idaho, August 1927.

Rhopalosiphum nymphae (L.). Blacksmith Fork Canyon; on leaves of watercress at Garfield and Locomotive Springs during April and May of 1930, sometimes found feeding below surface of water; *Cicuta occidentalis*, Logan; Willard.

R. rufomaculata (Wilson). On *Chrysanthemum* in greenhouse at Logan, February 27, 1928; Salt Lake City, March, 1923.

R. prunifoliae (Fitch). On wheat in experimental greenhouse at Logan, January and February, 1928; *Crataegus,* Logan Canyon, June 23, 1925.

R. melliferum (Hottes). On parsnip, Farmington, September 9, 1923; Logan Canyon, August 15, 1923.

R. serotinae Oest. On *Solidago,* Hyrum, June 17, and Logan, June 20, 1926.

Toxoptera graminum (Rond.). On oats, Circleville, July 14, 1925.

Amphorophora sonchi (Oest.). On *Ribes,* Collinston, November 7, 1929.

A. rubiella (Davis). On *Ribes,* Wellsville, September 2, 1930.

Capitophorus potentillae (Walk.). On rose, Rollap. June 12, 1933; Newton, April 14, 1934.

C. shepherdiae G. and B. Elsinore, July 27, 1927.

Cryptomyzus ribis (L.). Distorting red currant leaves at Brigham, April 21, 1930; Farmington, Greenville; Hyde Park, Logan; Salt Lake City; Wellsville. Also at Bozeman, Montana, June 17, 1929 (Knowlton); and at Clifton, Idaho, August, 1929.

Kakimia essigi (G. and P.) On *Aquilegia,* Bozeman, Montana, August 11, 1926 (Philip).

Macrosiphum taraxaci (Kalt.). On *Taraxacum* at Panguitch, July 14, 1925; Provo, August, 1925. Also Bozeman, Montana, September 17, 1927 (Philip).

M. ambrosiae Ths. On *Solidago* and *Aster,* Logan, July, 1928; also Puyallup, Wash. (Hanson).

M. gaurae Wms. On *Oenothera* at Richfield, June 24, 1926.

M. mentzeliae Wilson. On Mentzelia, Logan, August 24, 1925.

M. laevigatae Essig. On *Salix* at Red Canyon and Cedar Brakes, July 8, 1925; Millville, July 18, 1925; Morgan, June 30, 1925.

M. rudbeckiae (Fitch). On *Rudbeckia,* Salt Lake City, August, 1925. Also Puyallup, Wash. (Hanson).

M. albifrons Essig. On *Lupinus,* Panguitch, July 14, 1925.

M. coweni (Hunter). On *Artemisia tridentata* at Amalga, July 28, 1934; Hurricane, July 11, 1925.

Macrosiphum zerozalphum n. sp.

Apterous vivipara.—Color, yellowish-green; size 2.45 to 2.85 mm. long; body more or less rugulose; antennae 2.45 to 3.0 mm. long; antennal III, 0.67 to 0.80 mm. long, with 5 to 9 sensoria; IV, 0.37 to 0.51; V. 0.39 to 0.45; VI, 0.10+0.73 to 0.15+0.88 mm.; rostrum reaching second coxae, tip slenderly obtuse, joints IV+V, 0.18 mm. long; hind tibiae 1.65 to 1.83 mm.; hind tarsi 0.15; cornicles 0.63 to 0.78 mm.; imbricated, usually curved, slimmer on distal half with well developed flange, pale, slightly dusky toward apex; cauda pale, about 0.33 mm. along mid-line, with 4 (occasionally 5) hairs on each side. *Alate vivipara.*—Size 2.31 by 0.81 mm.; hairs on vertex 0.025 to 0.03 mm.; antennae 2.77 mm.; antennal III, 0.54 to 0.59 mm. long with 18 to 23 sensoria; IV, 0.40 to 0.46; V, 0.43; VI, 0.13+0.71 to 0.75; rostral IV+V 0.16 mm.; hind tibiae 1.74 mm.; hind tarsi 0.14; cornicles 0.57 mm.; anal plate broadly rounded to slightly flattened across end.

Macrosiphum zerozalphum is near to but differs from *M. cornelli* Patch in aptera having fewer sensoria which are confined to basal two-fifths of segment,

not extending over full length of antennal III. It differs from *M. pelargonii* (Kalt.) in having shorter antennal III and filament in alate, longer cornicles in aptera, and lighter body color.

Eriosoma americana (Riley). On *Ulmus americanum*, Hyrum, June 17, 1926; Salt Lake City, June 8, 1924 (Det. A. C. Maxson).

E. pyricola B. and D. At Chester, September 20, 1927; Collinston; Elsinore; Honeyville; Nephi.

E. lanigera (Haus.). On apple, Logan, September 27, 1928; also collected at Reno, Nevada, June 17, 1934; St. Craix Falls, Wisconsin, May 29, 1926, on *Ulmus americanum*.

Forda olivacea Rohwer. In ant nest, Three Forks, Montana, May 13, 1927 (Philip).

Geoica squamosa Hart. In ant nest, Logan Canyon, March 25, 1933.

Trifidaphis phaseoli (Pass.). One alate, accidental (?) upon *Juniperus virginiana*, Logan, June 25, 1928; in ant nest, Logan Canyon, March 25, 1933.

A NEW GENUS AND SPECIES FROM ALASKA (LEPID., ARCTIIDAE, NYCTEMERINAE)

BY FOSTER H. BENJAMIN,

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In handling some miscellaneous material belonging to the U. S. National Museum the writer noticed a unique specimen of a new genus and species of much interest as presenting additional evidence of the close relationship of those two large and important families, the Arctiidae and the Lymantriidae. A similar specimen, submitted by Dr. J. McDunnough, has served to amplify the descriptions.

Acsala new genus.

Type.—*Acsala anomala*, n. sp.

Male antenna mainly bipectinate, the basal joint much enlarged, the length of the pectinations gradually decreasing toward the tip of the antenna to form a few terminal biserrations. Tongue aborted, very short, basal half thick, distal half thin. Eye rough in appearance, about one and one-half times as high as wide, hairy, the hair long but sparse; frontal hair near the vertex overhanging the eye like lashes. Palpus short, scarcely reaching the clypeus. Frons slightly excurved, roughly granular (with more or less of a median depression, vertical in the type, the depression probably only the result of the drying and shrinking of the frons, its appearance indicating that it may not be present in some individuals). Ocelli absent. Head covered with fuscous brown vestiture of hair and flattened hair. Collar hairy, yellow, contrasting as in many Lithosiinae; the remainder of the thorax and the abdomen with hairy vestiture concolorous with that of the head; no noticeable crests or tufts. Build and habitus of a lithosiine. Tympanum not visible. Wings sparsely clothed with short hair and short hair-like scales. Frenulum strong, single in male, retinaculum nearly bar-shaped. Fore wing: Venation variable in some minor characters as indicated; veins 1a and 1c obsolescent; 3, 5 from near angle of cell; 6 variable, from below upper angle (in type), or from the small areole (in paratype); 9 from 10 anastomosing with 7 and 8 to form the short areole, 7 being stalked with the stem of 8 plus 9 and 9 free only as

a short oblique to costa well before apex; 11 free, from about three-fourths out on cell (in type and 1 fore wing of paratype, freakishly anastomosing with 12 for a short distance in other fore wing of paratype). Hind wings: Veins 1a and 1c obsolescent; 2 from about two-thirds out on cell, remote from discocellulars; 3 from lower angle, either connate with the stem of the shortly stalked 4 and 5 (in type), or all three veins connate (in paratype); 6, 7 somewhat variable, stalked for more than half the distance between cell and termen (in type), or stalked almost to termen (in paratype); 8 free from the stem of 6 and 7 but parallel, and connected (in paratype), or nearly connected (in type), to cell slightly distad of basal third by a bar, or "cross vein" (R_1 according to Comstock); no precostal spur; no recurrent vein.

Acsala anomala n. sp.

Vestiture concolorous fuscous brown except a strongly contrasting bright yellow collar; no maculation; the wings semihyaline; the venation conspicuous; the entire thorax and abdomen, excepting the collar, appearing blackish because of the dark chitin being visible through the scaling.[1] Expanse 27-28 mm.

Genitalia heavily chitinized; harpe without defined clasper, ampulla, digitus, or corona, narrowed and setulose toward the tip, the costa strongly lobate toward the base, the sacculus long and tapering; transtilla conspicuous, strong, fused with anellus to form a tube for the aedoeagus, the basal part of the anellus (the juxta) spatulate and curved; no gnathos; no scaphium; no socii; uncus short, with a double keel-like ridge externally near base; vinculum short; aedoeagus short, curved, unarmed; no secondary sexual characters visible in abdomen.

Number of sexes and types: Holotype ♂, near creek, Yukon, Alaska; 1 ♂ paratype, labeled "Klondike R." Cat. No. 50626, U.S.N.M.

Notes: Described from 2 males, one from unidentified material belonging to the U. S. National Museum, the other submitted by Dr. J. McDunnough, to be described as the paratype and returned to the Canadian National Collection.

In general, specialization of venation in the Lepidoptera is in the direction of reduction. The entire distinctness of vein 8 (the subcosta) of the hind wing from vein 7 is a relatively primitive character, as is also the presence of the bar connecting vein 8 with the cell, this bar representing radius 1, a vein which has been eliminated from both the Lithosiinae and the Arctiinae. The retention of the areole of the fore wing is, in so far as the Bombycoidea are concerned, another primitive character, many of the more specialized Lymantriidae, and Arctiinae, and most of the Lithosiinae, having lost this accessory cell. The narrowing of the eye, the production of distinct hair thereon, the abortion of the tongue, and the lack of ocelli are specializations which occur sporadically in the Macroheterocera, and do not necessarily signify any single family or sub-family. The possession of a contrasting yellow collar is a specialization which would be unique within the Lymantriidae, but is quite usual in the Lithosiinae. While this char-

[1]A visualization of the appearance of the present species may be obtained by consulting the figure of the female paratype of *Parabarrovia keelei* Gibson (1920, Rept. Can. Arc. Exped., 3 (1); pl. 5, fig. 9) which is similar in appearance except for the lack of the yellow collar. The descriptive text for *P. keelei* (l. c., p. 33) mentions some luteous on the fore wing of that species but this is not evident in the figure. The writer was inclined to think that this paratype might have represented a specimen of the present species, but Dr. McDunnough has stated otherwise.

acter is one of color, and has been developed in relatively unrelated groups, once developed it has persisted in at least several related organisms in each group. Coupled with this character is the distinctly lithosiine build, habitus, and sparse vestiture, three features unknown in the Lymantriidae. The antennal pectinations gradually decrease in length toward the tip of the antenna as is usual in the entire arctiid series, whereas the Lymantriidae are usually specialized in having the antenna almost as broadly pectinated toward the tip as at the base. The habitat would also be most unusual for a member of the family Lymantriidae. The latter are essentially a tropical and temperate climate group of insects which are relatively primitive in regard to the subcostal and radial venation of the hind wing, but are very highly specialized in other ways. The 2 known Arctic species which belong in *Dasychira* are quite typical of an extensive group of temperate-climate species.

While the writer believes that the present genus represents a separate and unnamed family, a specialized survival of a pre-arctiid ancestry[2], after discussion with various workers the conclusion has been reached that it may temporarily rest in the Nyctemerinae following Seitz' placement of *Hipocrita, Hyalocoa*[3] and *Hyperborea.*

The venational characters indicate that the original stem of the now specialized Lymantriidae also must have come from some such ancestry, with still another specialization preserved in the Hypsidae. Substantiating this theory of relationship is the fact that the genitalia of the new genus are definitely of the style of the bombycids (in the broad sense), and could indicate its placement either as a unique arctiid or a unique lymantriid, but placement with the Lymantriidae would cause association with tropical species. Actually the genitalia agree better with those of *Hipocrita* than with those of any other bombycid seen by the writer.

The idea of close relationship of the Arctiidae and the Lymantriidae is not new, having been advanced by Meyrick, Forbes, Seitz, and many other workers.

DESCRIPTION OF THREE NEW CANADIAN PERLIDS

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While at the University of Toronto in the spring of 1934, the author had the privilege of examining the Plecoptera of the collection of the Royal Ontario Museum of Zoology. It soon became apparent that a number of undescribed species were represented therein, and the present paper describes three of the most interesting of them. It is the interest and assistance of Dr. E. M. Walker and Dr. F. P. Ide that has made possible the descriptions appearing in this and in subsequent papers.

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[2]In a region (Siberia-Alaska) which was in general, exempt from Pleistocene glaciation and cut off from the remainder of America by a continental ice cap.

[3]While *Hyalocoa* superficially resembles the present new genus and has been placed placed in the Nyctemerinae by Seitz, Sir G. O'Hale Carpenter has informed me that the single specimen (♀) of the genotype, *Hyalocoa diaphana* Eversm., in the Hope Museum, has arctiid venation, tongue, and ocelli. Lord Rothschild has informed me that the Tring Museum possesses 6 males and 1 female of *Hyalocoa diaphana* Bang-Haas, and that "the genus *Hyalocoa* is a true arctiid genus belonging to the subfamily Arctiinae."

Chloroperla idei n. sp.

Male: Length to tip of wings: 7 mm.

General colour rich chloral green in life, mostly fading to yellowish when dried, except notably the veins of the wings.

Head wider than prothorax, yellow with a greenish cast; ocelli surrounded by blackish rings of irregular outline; ocelli form a depressed-isosceles triangle, the hind ones closer to the eyes than to each other; antennae greyish and nearly transparent (probably green in life) except the yellow basal segment; mouth parts green and yellow, tip of lacinia light brown, fourth segment of maxillary palpi about 1/5 of the length of the third.

Prothorax wider than long, front margin slightly convex, hind one nearly straight, sides rounded almost to semicircles; colour yellow; the sides somewhat roughened, marginal groove continuous and distinct. Legs green and yellow, tips of tarsi dark. Wings hyaline, veins green; venation much as in *C. cydippe* Newman, second anal vein of forewing branched.

Abdomen yellow, terminal segments darker, and a trace of a brown dorsal stripe; rather densely covered with long pale hairs; tails yellow and hirsute, 8-segmented.

Ninth abdominal segment produced ventrally, though not as far as in *C. cydippe*, rounded and hairy behind. Supra-anal process hairy, inverted triangular when viewed from the side; elongate-triangular from above, attached caudally at the narrow end of the triangle, and divided anteriorly into a low ridge on either side of the mid-line. Posterior part of the ninth segment long-hirsute but not spinose dorsally, elevated like a cowl over a small chitinous plate on its hind margin below. Penis indistinguishable, evidently not scleritized.

Female: Unknown.

Holotype: ♂, South Bolton, Quebec, 3.vii.32 (F. P. Ide), in Royal Ontario Museum of Zoology.

Paratype: 1 ♂, same data as holotype.

Chloroperla milnei n. sp.

Length to tip of wings, ♂: 8 mm., ♀: 8 mm.

General colour rich chloral green in life, fading considerably when dried, but remaining on legs and wing veins.

Head wider than prothorax, yellow; ocelli ringed with black, the rings continuous in some specimens with a short band of dark pigment running forward and/or sideways toward the eyes; ocelli forming a depressed-isosceles triangle, the hind ones closer to the eyes than to each other; antennae with basal segment yellow, the next eight or so yellow or brown, outer ones dark brown or black; mouth parts mostly green, top of labial palpi dark; terminal segment of maxillary palpi about 1/5 of the length of the penultimate, lacinia brown.

Prothorax wider than long, front and hind margins slightly convex, sides and angles broadly rounded; colour yellow, rugosities not pronounced. Legs green, tips of tarsi dark (two specimens, including the allotype, have the metathoracic legs brownish yellow, tarsi and outer half of tibia blackish). Wings greenish-hyaline, veins rich green; venation as in *C. cydippe* Newman; second anal vein of fore wing branched, hind wing without a folded anal field.

Abdomen villous, yellow toward the base, brownish toward the tip; tails green, 7-segmented.

Male: Ninth abdominal segment little produced ventrally; dorsally it is erected into a cowl whose sides are brown and thickly chitinized, hairy but not spinose. Supra-anal plate consists of two parts: the inner or anterior one heavily chitinized, arched to fit into the top of the cowl of the ninth segment, covered by long erect hairs; the outer or posterior part is little if at all chitinized, straight, tapered to a slightly bulbous tip, and all except that tip thickly covered with a short retrorsely-appressed pubescence. Penis indistinguishable, evidently not chitinized.

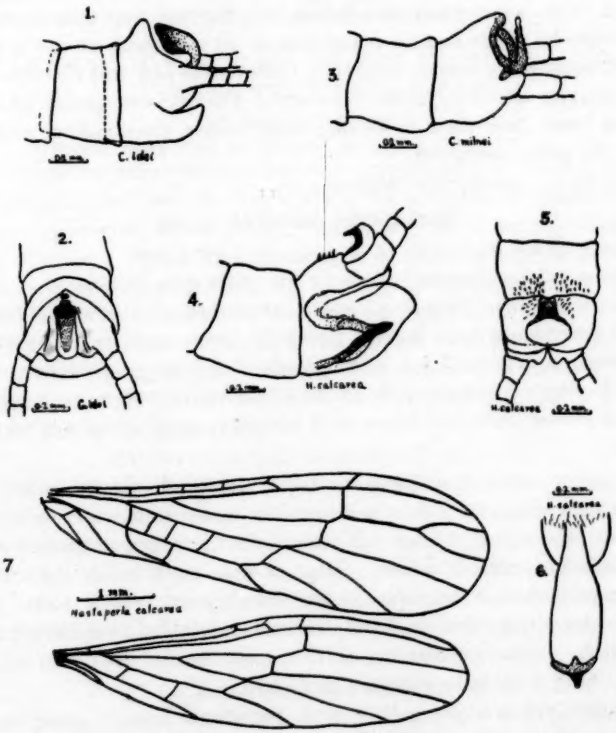

Fig. 1. Depilated tip of abdomen of ♂ of *Chloroperla idei*, viewed from the side. Fig. 2. The same, viewed from above. Fig. 3. Tip of abdomen of ♂ of *Chloroperla milnei*. Depilated, except the outer division of the supra-anal plate. Fig. 4. Depilated tip of abdomen of ♂ of *Hastaperla calcarea*, viewed from the side. Fig. 5. The same, viewed from above. Fig. 6. Protruded penis of *Hastaperla calcarea*, from a dried specimen. Fig. 7. Wings of *Hastaperla calcarea*.

Female: Hind border of the eighth sternite produced, near the mid-line only, into a triangular acute process, whose tip lies not more than quarter way across the ninth segment.

Holotype: ♂, Knowlton, Quebec, 29.vi.30 (L. J. Milne), in Royal Ontario Museum of Zoology.

Allotype: ♀, same data, in R.O.M.Z.

Paratypes: Same data as cotypes, 3 ♂ ♂.

This species is slightly larger and (in this material) more intensely coloured than *C. idei*; it is distinguishable from that species and from *C. cydippe* by the very different anal plate in the ♂, and from *C. cydippe* at least by the subgenital plate in the ♀.

Hastaperla n. gen.

Small stoneflies, most closely related to *Chloroperla* Newman as used by Needham and Claassen, with which they agree in having no folded anal area in the hind wing. Separated from that genus because the anal cell of the forewing gives off a *single unbranched* vein below, i.e., the 2nd anal vein is not bifurcate as in *Chloroperla*. This feature is constant in all specimens of the genotype, and the forked condition is just as regular in *Chloroperla idei* and *C. milnei* described above, apparently also *C. cydippe* Newman. The present species of *Hastaperla* also differs from these three in lacking their intense green colour, and in having the tip of the penis chitinized.

Genotype: *Hastaperla calcarea* n. sp.

Hastaperla calcarea n. sp.

Length to tip of wings: ♂ 7 mm., ♀ 7.5-8.5 mm.

General colour greenish yellow in life, drying to yellow.

Head wider than prothorax, yellow, unmarked or with a light brown mark from ocelli anterolaterally to a point above the eyes; ocelli narrowly ringed with black, forming a depressed-isosceles triangle, the hind ones closer to the eyes than to each other; antennae with six basal segments yellow, remainder brown; mouth parts yellow; terminal segment of maxillary palpi about 1/5 of the length of the third.

Prothorax wider than long, its front and hind margins nearly straight, sides and angles rounded; colour yellow with brown tints above, yellow below; rugosites not pronounced. Legs pale, tarsi brown, darker at their tips. Wings clear hyaline, veins greenish yellow. Subcosta ends much before the cord; several costal cross-veins before the end of Sc, one beyond; radial sector with two branches in fore-wing, one in hind; second cubital of fore-wing short and downcurved, its origin opposite tip of first anal; second anal vein of forewing unbranched; hind wing lacks a folded anal field.

Abdomen yellow; tails pale, 7 or 8 segmented.

Male: Ninth abdominal segment produced ventrally, rounded and hairy behind. Lying beneath is the penis, on either side of which is a curved chitinous process, meeting at the posterior end to form a blunt prong-like tip—this structure not readily distinguished in dried specimens, unless penis is partially or wholly protruded, but very conspicuous in a cleared mount. Supra-anal plate a short recurved scleritized plate, lying in front of a rounded hairy eminence. Posterior part of ninth segment spinose dorsally on either side of the unarmed mid-line; tenth segment spinulose dorsally in the corners adjacent to the supra-anal plate.

Female: Subgenital plate of eighth segment produced over most of segment 9, triangular, rounded at the tip.

Holotype: ♂, small cold creek near Horning's Mills, Dufferin Co., Ontario, 27.vi.28 (W.E.R.), in Royal Ontario Museum of Zoology.

Allotype: ♀, the same, 21.vi.28 (F. P. Ide), in R. O. M. Z.

Paratypes: Same locality as cotypes, 19.vi.-11.vii. 28, 2 ♂ ♂, 11 ♀ ♀, (F.P.I. & W.E.R.). Mad river near Singhampton, Grey Co., Ont., 1 ♂, 23.v.30 (W.E.R.), 2 ♀ ♀, 11.vi.30 and 4.vi.31 (F.P.I.). Fredericton, New Brunswick: 1 ♂, 16.vi.33 (C. E. Atwood).

Notes. Females taken June 27, 1928, were ovipositing. Most of the Horning's Mills specimens had several small bright red hydrachnids (?) lying in the groove between thorax and abdomen dorsally. The name *calcarea* refers to the limy streams near which the types were collected.

THE NEARACTIC SAWFLIES OF THE DINEURA COMPLEX[1] (HYMEN.: TENTHREDINIDAE).

BY HERBERT H. ROSS,

Illinois State Natural History Survey, Urbana, Illinois.

The nematine genus *Dineura* has had assigned to it at various times several species of nearctic sawflies. A close study of these species indicates that *Dineura* itself is not represented in our fauna, but instead three genera which resemble it in wing venation. This complex was considered by MacGillivray as the subfamily Dineurinae, but as pointed out by Rohwer it is in reality part of the Nematinae. The three genera involved may be separated from the other Nematinae by having the front wings[2] with the base of vein 2A and 3A absent and the second radial cross-vein (2r) present. The extreme differences between the genera suggest strongly that the segregate is purely an artificial one based only on accidental similarity in venation.

KEY TO NEARCTIC "DINEURINE" GENERA.

1. Tarsal claws cleft, with a large inner tooth, fig. 8.....*Adelomos*
   Tarsal claws simple, without an inner tooth..... 2
2. Malar space wanting. Hind wings with anal cell open due to atrophy of vein 2A & 3A, fig. 11 .....*Pseudodineura*
   Malar space distinct, as wide as length of second antennal segment. Hind wings with anal cell closed, vein 2A & 3A well developed, fig. 10....
   ..... *Neopareophora*

Adelomos new genus.

This genus is most closely related to *Dineura* but may be separated from it by the filiform, stocky antennae. From *Neopareophora* MacG., its nearest ally in North America, it differs in having the tarsal claws cleft. It may be separated from all sawflies known to me by the presence of a radial cross-vein in the hind wing, fig. 9, r.

Characteristics.—Belongs in the subfamily Nematinae. Body short and robust. Wing venation as in the *Dineura* group having the front wings, fig. 4, with second radial cross-vein present, and base of third anal vein absent. Hind

[1]The author wishes to express his gratitude to Dr. T. H. Frison, Illinois Natural History Survey, and Mr. E. T. Cresson, Jr., Philadelphia Academy of Sciences, for valuable notes made in comparison with the Norton and Cresson types involved in this paper.

[2]The terminology of the wing veins follows that presented by the author in a paper now in the press.

wings with a radial cross-vein, fig. 9. Prepectus present, well-defined, triangular and of moderate size. Antennae, fig. 1, almost filiform, the segments of the flagellum distinctly narrower at the base and wider at the apex. Right mandible, fig 6, broad at base with a fairly narrow blade. Tarsal claws cleft, the inner tooth stout and almost as long as the outer, fig. 8.

Genotype.—Adelomos cleone Ross (original designation, also monobasic).

Adelomos cleone n. sp.

Female.—Length of body, 5 mm., length of front wing, 7 mm. Color: head mottled; clypeus, labrum and mouthparts straw color, flagellum of antennae, eyes and a large, irregular blotch including and posterior to, ocelli, black, remainder

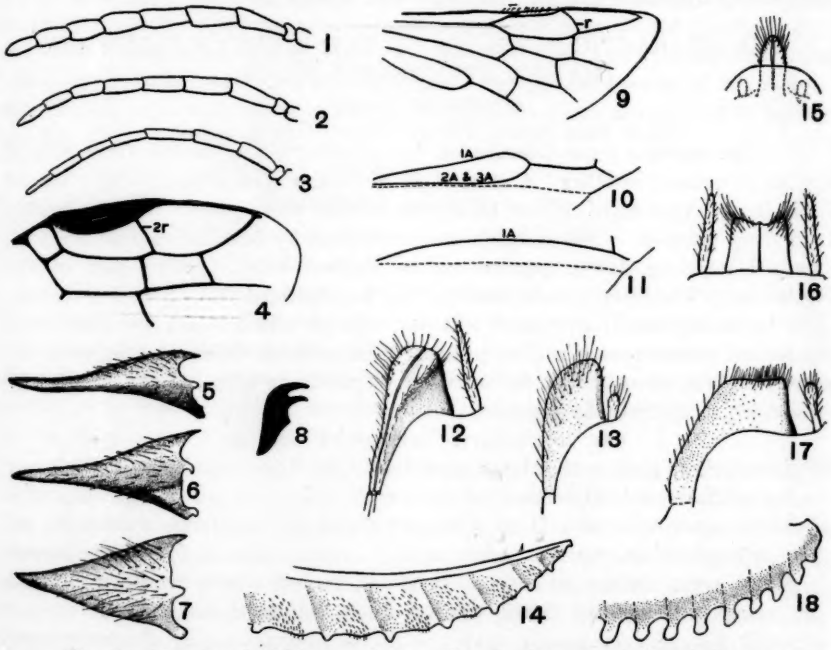

Fig. 1.—Antenna of *Adelomos cleone*. Fig. 2.—Antenna of *Pseudodineura parva*. Fig. 3.—Antenna of *Neopareophora litura*. Fig. 4.—Portion of front wing of *Adelomos cleone*. Fig. 5.—Left mandible of *Neopareophora litura*, lateral aspect. Fig. 6.—Left mandible of *Adelomos cleone*, lateral aspect. Fig. 7.—Left mandible of *Pseudodineura parva*, lateral aspect. 8.—Tarsal claw of *Adelomos cleone*. Fig. 9.—Portion of hind wing of *Adelomos cleone*. Fig. 10.—Anal veins of hind wing of *Neopareophora litura*. Fig. 11.—Anal veins of hind wing of *Pseudodineura parva*. Fig. 12.—Sheath of *Neopareophora litura*, ventro-lateral aspect. Fig. 13.—Sheath of *Pseudodineura parva*, lateral aspect. Fig. 14.—Portion of lancet of *Pseudodineura parva*. Fig. 15.—Sheath of *Pseudodineura parva*, dorsal aspect. Fig. 16.—Sheath of *Neopareophora litura*, dorsal aspect. Fig. 17.—Sheath of *Adelomos cleone*, lateral aspect. Fig. 18.—Portion of lancet of *Adelomos cleone*. 1A=first anal vein. 2A and 3A=second and third anal vein (serial). r=radial cross-vein. 2r=second radial cross-vein.

of head light brown or reddish brown; thorax and abdomen, including legs and sheath, brown, the pronotum and tegulae being a lighter shade. Wings hyaline; veins and stigma light brown except base of radio-medial stem, which is black.

Head almost as wide as pronotum, slightly striate, shining, with short, sparse pubescence. Labrum wide, moderately emarginate; clypeus arcuately

emarginate over its entire width; supraclypeal area prominent, rounded. Median fovea large, rather indefinite. Ocellar basin practically flat, with two distinct furrows running from behind the median ocellus to the frontal crest, which is obsolescent. Postocellar area confluent with postocular area. Eyes large, extending over almost the entire depth of the head, emarginate on the mesal margin.

Dorsum of thorax dull, with close, fine punctures, the scutellum slightly more shining. Upper pleura shining, lower pleura and pectus dull, like mesonotum.

Abdomen very finely reticulate. Cerci short, only half dorsal length of sheath. Sheath, fig. 17, moderately stout, apex almost truncate, ventral margin straight and oblique. Saw (from lateral view) broad and short; lance with prominent spatulate lobes on the ventral margin, fig. 18.

Holotype.— ♀ ; Urbana, Illinois, April 22, 1933, on flowers of *Aesculus glabra* Willd., in Brownfield's Woods (A. R. Park, Jr.). This and the single paratype are deposited in the collection of the Illinois State Natural History Survey.

Paratype.— ♀ ; Urbana, Illinois, April 23, 1892, from flowers (McElfresh) (17868).

Genus **Pseudodineura** Konow.

Pelmatopus Hartig, Fam. Blattw. Holzwespen, 1837, p. 244. Preoccupied by *Pelmatopus* Fischer, 1823, in Coleoptera.

Pseudodineura Konow, Wien, ent. Ziet., Vol. 4, 1885, p. 297.

This genus resembles *Neopareophora* MacGillivray in wing venation and somewhat in size and general habitus. It is very different from it, however, in many significant characters, as follows: malar space wanting; antennae subfiliform, fig 2; mandibles broad and triangular from a side view, fig. 7; and hind wings with the anal cell open, vein 2A & 3A having atrophied, fig. 11. Mr. Robert B. Benson of the British Museum has told me of the preoccupation of Hartig's name.

Enslin includes *Pseudodineura* in his Blennocampini, but it is very distinctly a member of the *Dineura* group of the Nematinae, having all the essentials of the specialized nematine wing except for the second radial cross-vein, which is still present. The genus has never had any nearctic species assigned to it previously.

Pseudodineura parva (Norton)

Dineura parvus Norton, Trans. Amer. Ent. Soc., vol. 1, 1867, p. 241, ♂.

Female.—Length 4 mm. Color predominantly black and brown. Head black, including antennae, with apical portion of clypeus and most of mouthparts reddish brown. Thorax with prosternum, pectus, mesepimera, all but margins of mesonotum, and metathorax, black or brownish black and with the collar, tegulae, all or most of mesoepisternum, and margins of mesonotum, yellowish brown. Abdomen black or brownish black with two dorsal rows of transverse lighter areas, segmentally arranged on each side of the meson. Legs yellowish, bases of femora and coxae sometimes suffused with brown. Wings almost imperceptibly stained with brown, with veins, costa and stigma all light brown.

Body robust, short and stocky, and clothed with fine white pubescence.

Head dull, portion above antennal sockets densely micro-tuberculate; seen from above, twice as wide as its mesal length. Median fovea and bounding furrows of ocellar basin obsolete, at most almost imperceptibly indicated. Clypeus with apical margin shallowly V-emarginate for its entire width, and with a median carina which is wide and rounded at base, tapering to a point at the apical margin. Supraclypeal area considerably raised, narrow and with the crest rounded transversely. Eyes large, extending from mandibles to near posterior margin of head. Postocellar area subatrophied, the lateral ocellus situated only their own diameter from posterior margin of head.

Thorax shining, all sclerites practically impunctate. Prepectus large and triangular, polished and impunctate. Tarsal claws slender, without an inner tooth.

Abdomen with almost all of the mesal area of basal plates membranous. Other tergites minutely striate except at extreme base. Sternites almost entirely shining, only slightly striate. Sheath thin, clothed with moderaely long fine hairs, shining, with dorsal margin almost straight, ventral margin convex, figs. 13, 15. Saw with simple armature, consisting of fairly widely spaced, small, tuberculate teeth, fig. 14; between these are patches of microtrichiae, some of which project beyond the ventral margin.

Male.—Length 4 mm. Color black with the mouthparts, lateral corners of pronotum, tegulae, apical abdominal tergite and sternite and genitalia yellowish brown. Legs yellowish brown with most of coxae black.

Structure similar to female with the following differences: antennae stout, decidedly tapering, with basal portion somewhat enlarged and bi-laterally compressed. Procidentia not developed. Apical sternite with apical exposed portion forming a nearly perfect semicircle.

Allotype.— ♀ ; Hampton, New Hampshire, May 1, 1907, S. A. Shaw. In the collection of the Illinois State Natural History Survey.

The allotype is one of a series of four specimens from Hampton. The single male in the series has been compared with Norton's male type in the collection of the American Entomological Society.

This species is closely related to the European *P. mentiens* Thomson and *P. fusculus* Klug, differing from them in the female sex by the light mesoepisternum.

Genus **Neopareophora** MacGillivray.

Neopareophora MacGillivray, Can. Ent., Vol. 40, No. 8, Aug., 1908, p. 289.
Dineuridea Rohwer, Proc. U. S. Nat. Mus., Vol. 43, No. 1930, Sept. 30, 1912, p. 240. *New synonymy.*

The genus *Neopareophora,* with *N. martini* MacGillivray designated as its genotype, was erroneously placed in the subfamily Blennocampinae by its describer. It has apparently not been recognized or placed by anyone else. A study of the holotype of *N. martini* shows it to be congeneric with *Dineuridea* Rohwer, which has *Marlattia erythrothorax* Rohwer for genotype.

This genus is most likely to be confused with *Pseudodineura* Konow, but has these distinctive characteristics: malar space distinct; antennae long and tapering, fig. 3; mandibles narrow, right one appearing thin and blade-like from lateral view, fig. 5; anal cell of hind wings closed, fig. 10. In addition the female has the sheath thick, the lateral margins shelf-like, the cerci long and extending beyond sheath, figs. 12, 16.

KEY TO NEARCTIC SPECIES.

Entire dorsum of mesothorax yellowish-brown.....*erythrothorax*
At least a wide median vitta on dorsum of mesothorax black, sometimes with the entire dorsum almost black .....*litura*

Neopareophora litura (Klug).

Dineura litura Klug. Mag. Ges. Nat. Fr. Berlin, Vol. 8, 1814, p. 83, ♀.
Dineura linitus Norton, Trans. Amer. Ent. Soc., Vol. 1, Sept., 1867, p. 240, ♀. *New synonymy.*
Dineura lateralis Norton, *ibid.*, ♀. *New synonymy.*
Dineura luteipes Cresson, *ibid.*, Vol. 8, Jan., 1880, p. 11, ♂. *New synonymy.*
Neopareophora martini MacGillivray, Can. Ent., Vol. 40, No. 7, Aug. 1908, p. 289, ♀. *New synonymy.*

The holotype of *N. martini* agrees with the specimen from Karner, N. Y., upon which is based the record of *Dineura litura* (Klug) in the "List of the Insects of New York." This specimen agrees very well with Klug's original description, except for the black area on the middle of the pectus, which could easily be overlooked, and might conceivably be absent in some individuals. It represents the first definite record of the species under the name "*litura* Klug" since its original description and has been labelled as a plesiotype. The type of *Dineura linitus* Norton agrees almost perfectly both in color and structure with this concept of *litura* (Klug) and the type of *D. luteipes* Cresson from Maine is almost certainly the male of the species. This is the only male of this species yet known.

The females vary considerably in color. The commoner type has the thorax and abdomen yellow or yellowish brown with a distinct black stripe along the meson of the thorax and more or less indicated on the abdomen. In some specimens, however, the yellowish part of the body may be darker than average or almost black, obscuring the vittate condition. The type of *Dineura lateralis* Norton is midway between the two extremes as regards color.

The distribution of the species, based on only 10 specimens, is as follows: MAINE.—Brunswick. MASS.—Wellesley (May 9), West Springfield (May 7). N. H.—Hampton (May 11). N. Y.—Karner (May 14), Lake Clear (June 7). QUE.—Cascapedia river (June 15), host Black Spruce. Apparently it is restricted to the northern part of the Appalachian region, although the evidence is meagre.

Neopareophora erythrothorax (Rohwer)

Marlattia erythrothorax Rohwer, Proc. U. S. Nat. Mus., Vol. 41, No. 1866, Oct. 14, 1911, p. 385, ♀.

This species is extremely similar in structure to *litura*, but differs in color as noted in the preceding key. It was described from a female from Jacksonville, Florida, and has not been recorded since.

BOOK NOTICE.

"Applied Entomology, an Introductory Textbook of Insects in their relations to Man." 3rd edition, by H. T. Fernald. 397 pages and 384 figures. McGraw-Hill Book Co. $3.50.

In this revision of a well known textbook in general entomology, economic and systematic, the original arrangement of the chapters has been retained. One new chapter, on Arthropods, other than insects with which the entomologist is expected to deal, has been added.

The first part of the book, devoted to insects and their structure, remains essentially the same as in the earlier editions. The next part, dealing with the losses from insects, insect benefits and natural control, general control, biological and legal control, and insecticides, has been extensively revised to bring it into line with recent advances in these phases of entomology.

The main part of the book deals with the characteristics of the orders, the principal families of each order and the chief insects of economic importance in each family. The author has endeavored to include any imported insects of importance and insects which have come into prominence since the previous edition. This section covers, as thoroughly as could be expected in a book of this type, the essential features of the injury caused by, and the life history and control of, practically all the important destructive insects of North America.

This revision should prove a handy reference or text for undergraduate students in agriculture, and of use to others interested in the subject.

R. H. OZBURN.

Date of Mailing, Sept. 28, 1935.